

REMARKS

Introduction

In the specification, paragraphs [0028] and [0034] have been amended to correct minor editorial problems. Claims 1-15 were originally pending in this application. Claims 1, 5, 6, 9, 12 and 13 have been amended. Claims 4 and 11 have been cancelled. Thus, claims 1-3, 5-10 and 12-15 remain in this application.

Claim Rejections

35 U.S.C. §103(a)

Claims 1-3, 7-10 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Loughlin '904 patent in view of the Heart et al. '457 patent. Similarly, claims 4-6 and 11-13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Loughlin '904 patent in view of the Heart et al. '457 patent as applied to claims 1-3, 7-10 and 15 and further in view of the Fangman '929 patent. Claim 14 was also rejected under 35 U.S.C. § 103(a) as being unpatentable over the Loughlin '904 patent in view of the Heart et al. '457 patent as applied to claims 1-2, 8-10, and 15 and in further view of the DeBiasse '544 patent. Applicants respectfully traverse these rejections. However, in view of the Examiner's comments in the June 3, 2004 Office Action and the references presently of record in this case, applicants have amended independent claims 1 and 9, changed the dependencies of certain dependent claims and respectfully submit that the application is now in a condition for allowance.

The Prior Art

The Loughlin '904 Patent

The Loughlin '904 patent discloses a method of assembling a piston and connecting rod with a stepped wrist pin. Specifically, this patent teaches the method of coupling a connecting rod 14 to a piston 12 by a stepped wrist pin 18 through creating a temperature differential between the wrist pin 18 and the connecting rod 14 (Figs. 1-3) or between the wrist pin 84 and the piston 80 (Figs. 4-5). In order to provide the stepped configuration, the wrist pin 18 includes two end journals 36,38 and an intermediate journal 40 disposed therebetween, where the end journals 36,38 or 88,90 are either larger in diameter than the intermediate journal 40 (Figs.1-3) or smaller diameter than the intermediate journal 86 (Figs. 4-5). In either event, a stepped wrist pin 18 or 84 is provided to attach the connecting rod 14 or 82 to the piston 12 or 80 upon reaching an ambient temperature, thereby eliminating the need for additional attaching components such as lock rings, which cause engine failure when broken or misassembled. (Column1, lines 34-65). The Loughlin '904 patent further discloses the use of a bushing 42,106 to provide relative turning movement between the wrist pin 18 or 84 and connecting rod 14 or 82, which facilitates improved connection. (Column 3, lines 30-49).

Thus, the Loughlin '904 patent teaches a method for assembling a piston to a connecting rod having a bushing with a stepped wrist pin through thermal expansion and/or contraction to accommodate installation of a stepped wrist pin. The method of assembly is complete upon returning the piston or connecting rod and wrist pin to an ambient temperature. The use of a bushing within the area between the wrist pin and connecting rod is a conventional assembly that is well known in the art and was distinguished from the present invention in the background section of this patent application.

However, the Laughlin '904 patent does not disclose or suggest a bushingless pivot surface between the piston pin and connecting rod. Rather, the Laughlin '904 patent argues the importance of employing a bushing in this area (Column 3, lines 29-63 and Column 5, lines 39-44). The Laughlin '904 patent neither discloses nor suggests a connecting rod including a phosphatized coating to facilitate relative angular movement between the connecting rod and a profiled piston pin. Nor does the Laughlin '904 patent disclose or suggest a piston pin having a profiled outer circumference that includes a phosphatized coating bonded thereto. Moreover, the Laughlin '904 patent neither discloses nor suggests a bushingless connecting rod having a terminal end and a bore housing that tapers inwardly toward the terminal end as required by newly amended independent claims 1 and 9.

The Heart et al. '457 Patent

The Heart et al. '457 patent discloses bushingless piston and connecting rod assembly. Specifically, the Heart et al. '457 patent discloses a bushingless piston and connecting rod assembly coupled by a wrist pin, each including a running surface, where at least one running surface includes a manganese phosphate coating. The Heart et al. '457 patent employs a manganese phosphate coating 36 in lieu of a bushing within heavy-duty diesel engines where the tribological properties of the diesel engine tend to corrode traditional bushings and to more directly place the load during operation onto the parent materials of the connecting rod and wrist pin.

However, the Heart et al. '457 patent does not disclose or suggest the use of a profiled piston pin having an outer circumference that is substantially circular in cross-section with a larger diameter at the distal ends than at the center portion for use in connection with a

connecting rod having a phosphatized coating. Furthermore, the Heart et al. '457 patent neither discloses nor suggests a connecting rod having a terminal end and a bore housing that tapers inwardly toward the terminal end. Finally, the Heart et al. '457 patent neither discloses nor suggests this structure in combination with a phosphatized coating. In fact, Heart et al. teaches a non-profiled wrist pin and a non-tapered portion of the connecting rod that receives a wrist pin.

The Fangman '929 Patent

The Fangman '929 patent discloses a piston pin 17 having an I-beam shape for use in attaching a piston rod 15 to a piston 11. The Fangman '929 patent discloses that the I-beam effect of the piston pin 17 will distribute the force exerted between the piston 11 and pin 17 throughout the length of the pin 17 that is in contact with the piston 11 while still maintaining a proper oil film between them. The Fangman '929 teaches that it is known to provide a reduced mass piston rod 15.

However, the Fangman '929 patent does not make up for the deficiencies of the Laughlin '904 and Heart et al. '457 patents. More specifically, the Fangman '929 patent neither discloses nor suggests a piston pin having an outer circumference that is substantially circular in cross-section with a larger diameter at the distal ends than at the center portion for use in connection with a connecting rod having a phosphatized coating. Nor does the Fangman '929 patent disclose or suggest a profiled piston pin having a phosphatized coating to facilitate relative angular movement between the connecting rod bore and the profiled piston pin. Further, the Fangman '929 patent does not disclose or suggest a bushingless pivot surface between the piston pin and connecting rod.

The Present Invention

In contrast to that which is disclosed in the references of record in this case, the present invention as defined in independent claim 1 is directed toward a piston and connecting rod assembly for use with an internal combustion engine. The assembly includes a piston having a body including a pin bore and a connecting rod to interconnect the piston and a crankshaft. The connecting rod has first and second ends with at least one of the ends including a terminal end and a bore housing depending therefrom. The bore housing tapers inwardly toward the terminal end and includes a bore extending therethrough to be aligned with the pin bore in the piston. The assembly further includes a pin that is received through the aligned pin bore of the piston and the bore extending through the end of the connecting rod. The pin includes a pair of distal ends, a center portion formed therebetween and a profiled outer circumference that is substantially circular in cross-section with a larger diameter at the distal ends than at the center portion. The end of the connecting rod that is aligned with the piston pin bore includes a phosphatized coating to facilitate relative angular movement between the bore extending through the connecting rod and the outer circumference of the profiled piston pin. In addition, the present invention as defined in independent claim 9 is directed toward a piston and connecting rod assembly as described above where the profiled outer circumference of the pin also includes a phosphatized coating bonded thereto.

Argument

A rejection based on §103 must rest on a factual basis, with the facts being interpreted without a hindsight reconstruction of the invention from the prior art. Thus, in the context of an analysis under § 103, it is not sufficient merely to identify one reference that teaches several of

the limitations of a claim and another that teaches several limitations of a claim to support a rejection based on obviousness. This is because obviousness is not established by combining the basic disclosures of the prior art to produce the claimed invention absent a teaching or suggestion that the combination be made. Interconnect Planning Corp. v. Fiel, 774 F.2d 1132, 1143, 227 U.S.P.Q. (BNA) 543, 551 (Fed. Cir. 1985); In Re Corkhill, 771 F.2d 1496, 1501-02, 226 U.S.P.Q. (BNA) 1005, 1009-10 (Fed. Cir. 1985). The relevant analysis invokes a cornerstone principle of patent law:

That all elements of an invention may have been old (the normal situation), or some old and some new, or all new, is however, simply irrelevant. Virtually all inventions are combinations and virtually all are combinations of old elements. Environmental Designs v. Union Oil Co. of Cal., 713 F.2d 693, 698 (Fed. Cir. 1983) (other citations omitted).

A patentable invention . . . may result even if the inventor has, in effect, merely combined features, old in the art, for their known purpose without producing anything beyond the results inherent in their use. American Hoist & Derek Co. v. Sowa & Sons, Inc., 220 U.S.P.Q. (BNA) 763, 771 (Fed. Cir. 1984) (emphasis in original, other citations omitted).

As the Court of Appeals for the Federal Circuit recently noted, “[w]hen a rejection depends upon a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references.” Ecolochem, Inc. v. Southern Calif. Edison, 56 U.S.P.Q. 2d 1065, 1073 (Fed. Cir. 2000). Here, there is simply no motivation provided in any of the Laughlin, Heart et al., or Fangman patents to combine their teachings. Furthermore, even assuming that such a motivation existed, a combination of these references would not result in

the piston and connecting rod assembly of the type described in independent claims 1 and 9, as amended.

It is respectfully submitted that the Laughlin, Heart et al., and Fangman patents references skirt around, but do not suggest the claimed invention *as a whole*. See Hybritech Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 1383 (Fed. Cir. 1986). Further, it is respectfully submitted that one must pick and choose elements from the structurally dissimilar devices disclosed in the Laughlin, Heart et al., and Fangman patents and combine these elements by restructuring them, using hindsight and the applicants' own disclosure, to conclude that the claimed invention is obvious. Applicants respectfully submit that this would be improper in view of the disclosures of the prior art.

There is a fundamental axiom in patent law that if a reference must be reconstructed or rearranged to change its operation to meet the applicants' claim, that modification of the reference is inappropriate and cannot stand. The Laughlin '904 patent discloses a method for assembling a piston and connecting rod with a stepped wrist pin but employs a bushing to facilitate contact between the connecting rod and stepped wrist pin. On the other hand, the Heart et al. '457 patent discloses a bushingless piston and connecting rod assembly using a manganese phosphate coating in lieu of a bushing to eliminate corrosion within a diesel engine and directly place the load onto the wrist pin and connecting rod. This is entirely contrary to the use of a bushing taught by Laughlin. Furthermore, the Heart et al. '475 patent does not teach or suggest the use of a profiled piston pin or a tapered connecting rod to facilitate relative angular movement as identified in the present application. While the Fangman '929 patent advocates the use of a reduced mass piston rod, it teaches the use of an I-beam shaped piston pin. The Fangman disclosure bears no relation to the combination of a profiled piston pin and a tapered,

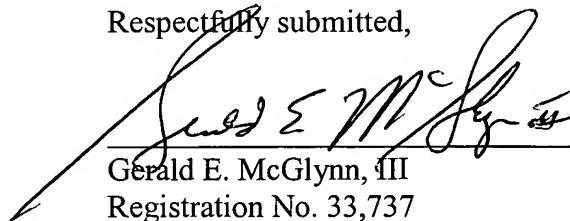
bushingless connecting rod including a phosphatized coating as disclosed by the present application. Thus, applicants respectfully submit that the disclosures of each of these references would have to be improperly modified to meet the limitations of independent claims 1 and 9.

Claims 2 – 8 and 10-15 are all ultimately dependent upon independent claims 1 and 9, respectively, and add further perfecting limitations. As such, the DeBiasse '544 patent and other prior art references in combination or each reference standing alone do not make up for the deficiencies of the Laughlin '904, Heart et al. '457 and Fangman '929 patents nor do they suggest the subject invention. However, even if they did, they could only be applied through hindsight after restructuring the disclosure of the prior art in view of applicants' invention. A combination of the prior art in this way to derive applicants' invention would, in and of itself, be an invention.

Conclusion

In view of the above, applicants respectfully submit that the claims clearly distinguish over the prior art and are therefore allowable. Accordingly, applicants respectfully solicit the allowance of the claims pending in this case.

Respectfully submitted,



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